White Mould: Germplasm Screening under Various Field Conditions in Ontario

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White mould (*Sclerotinia sclerotiorum*) has been one of the most serious diseases affecting dry bean production in Ontario, although the incidence of the disease varied with weather. The problem has become greater with shorter rotation periods and decreased row spacing that utilizes new upright navy bean varieties. Improvement of white mould resistance is one of the major goals in local bean breeding programmes.

In the past, germplasm was introduced from various sources and tested for resistance by employing different screening techniques: a) field nursery with severe white mould incidence, b) field screening nursery by adding sclerotia and maintaining high humidity by frequent sprinkling of water, c) inoculation of mycelium mass on leaf axile (Tu), d) application of oxalic acid on detached leaf disc (Tu), e) straw test (Petzoldt & Dickson, 1996) and f) inoculation of cut stems in a mist chamber (T. Anderson). However, no one screening method gave rise to consistent uniform results.

Results screening trials accumulated over the years from nurseries established under naturally infested conditions, artificially infested conditions and inoculation using the straw test in the field. All trials were replicated two to three times and disease incidence determined as a percent or visual severity rating. Results from the field nurseries were all converted to visual scores as 1 (trace to less than 5% infection of a plot), 2 (< 10%), 3 (< 30%), 4 (< 50%) and 5 (over 70%). Severity of the straw test was scored as 0 (no infection) to 8 (total collapse) after Hall & Phillips (1997). Results are summarized in Table 1 in two sections, up to 1996 and in 1997. Ex Rico 23 has field tolerance and is considered the standard tolerant variety in Ontario. GNwm1-89-11 was tolerant with a prostrate plant type and late in maturity. ND88-106-4 was also tolerant but poor combiner in crosses. A large brown seeded short bush type MO 162 was resistant and used with some coloured bean crosses. NY5223 and NY5263 derived from *P. coccineous* (Dickson) were quite resistant and used in crosses with navy beans with some success. Both of the lines are short bush types with oval seed similar to snap beans. It was difficult to recover good navy beans from the crosses. G122, a small bush cranberry seeded type was also tolerant and used in crossing with coloured beans.

Erect plant types such as OAC Laser, HR20 and A55 tend to have lower infection rates under wide rows by escape. Under severe disease pressure in narrow rows and adjacent to highly susceptible dry beans or tall soybean rows, they become quite susceptible. Currently, combining mould resistance with erect plant type is our breeding goal in Ontario.

Reference: Petzoldt, R. and M. H. Dickson. 1996. BIC Ann. Rpt. 139:142-143.
Hall, R. & L.G. Phillips. 1997. BIC Ann. Rpt. 40:138-139.

Table 1. Summary of reaction of drybean germplasm to white mould (*S. sclerotiorum*) under various field conditions in Ontario

Line/Variety	Source	Plant Type	Seed Type	Up to 1996 Ebert	1997		
					St. Thomas (1-5)	Harrow (1-5)	Straw Test (0-8)**
Mitchell	AAFC, ON	I	Navy	5*			
Envoy	Gentec, ON	I	Navy		5*	5*	6.0
Dresden	AAFC	I	Navy	5			
OAC Laser	UG	II[a]	Navy	2.5	2.5	3.0	3.9
OAC Silvercreek	UG	II[b]	Navy		2.5	2.0	4.5
Vista	Gentec	II[a]	Navy		2.5	3.0	5.7
ExRico 23	UG	II[b]	Navy	2	2.5	2.0	5.0
HR20	AAFC	II[a]	Navy	2.5			
A55	CIAT	II[a]	Black	2.5			
A300	CIAT	II	Cream	3.0	5.0	5.0	6.7
Huron	MSU	I	Navy	2.5	3.0	5.0	5.1
ND88-106-4	NDSU	II[b]	Navy	2.5	4	2	6.1
MO162	-	I	Brown	1.5	1	1	3.1
GNWM1-89-5	UNE	III	GN	3.0			
GNWM1-89-100	UNE	III	GN	4.0			
GNWM1-89-11	UNE	III	GN	3.0			
GNWM1-89-14	UNE	III	GN	2.0			
GNWM1-89-18	UNE	III	GN	3.0			
GNWM1-89-19	UNE	III	GN	2.5			
NY5223	Geneva, NY	I	Small White	1.5	1.0	2.0	3.8
NY5268	Geneva, NY	I	Small White	2.0	2.0	2.5	4.1
NY6317	Geneva, NY	II	Large White		4.0	4.5	5.3
NY6426	Geneva, NY	II[a]	Large White		3.0	4.7	5.1
NY6530	Geneva, NY	II[a]	Large White		4.0	4.3	5.40
I9365-1	Prosser, WA	I/II	Medium Red		3.5	4.0	4.5
I9365-3	Prosser, WA	II	Black		4.0	5.0	5.4
I9365-5	Prosser, WA	II[b]	Medium Red		4.0	4.8	4.5
I9365-19	Prosser, WA	II[a]	Medium Cream		5.0	5.0	7.3
I9365-35	Prosser, WA	II[a] LG	Black		2.0	4.0	4.6
92BG-7	Prosser, WA	II[a]	Large Brown		3.0	4.0	5.5
PI204.717	Prosser, WA	II[a]			3.0	5.0	5.9
K59	UW	II[a]	LRK		3.0	2.0	4.8
K407	UW	II[a]	DRK		3.0	2.0	4.4
G122	UW	I	Small crab		3.0	2.0	4.0

* Incidence scores (1-5): 1 (trace to <5%), 2 (<10%), 3 (<30%), 4 (<50%) and 5 (>70%)

** Straw test score (0-8): (Hall and Phillips, 1997); 0=no infection; 2=1st internode; 4=up to 2nd node; 6=over 2nd node